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Town of Falmouth

Plan for an Improved Transportation Network for Bicycling

January 6, 2016





Prepared by the Cape Cod Commission in cooperation with the Town of Falmouth and the Massachusetts Department of Transportation

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The Falmouth Bikeways Committee, consisting of citizen volunteers widely experienced in bicycling, transportation, and educational issues, contributed immeasurably to this Plan. They are Scott Lindell (Chair), Ed Gross (Vice-Chair), Ted Rowan (Treasurer), Jonathan Murray (Secretary), Bob Fitzpatrick, Kevin Lynch, Pamela Rothstein, JoAnn Fishbein, and Chris McGuire. We also had help from members of the Falmouth Bike Lab (Jeremy Tagliaferre and Anne Broache) and Friends of Falmouth Bikeways (Patty Leonard). The Bikeways Committee thanks Lev Malakhoff and Glenn Cannon for their valuable assistance. More information is available at bikeways@falmouthmass.us

Executive Summary

The 2015 Falmouth Bike Plan is a result of collaboration between the Town of Falmouth's Bikeways Committee and the transportation staff of the Cape Cod Commission.

Between 2010 and 2012 there were 43 reported crashes involving bicycles in Falmouth. It is widely accepted that many more occur but are unreported. This fact serves as one catalyst for action. The Plan identifies numerous problems on roads that would be desirable for bicycling if corrective actions such as reducing motorist speed and installing wider shoulders or bike lanes were implemented to encourage people who want to ride bicycles to feel safe.

The Plan's recommendations focus on the "Three E's" of bicycle transportation planning: Engineering, Education and Enforcement. Engineering includes making improvements for safer road crossings, separated multi-use paths, bike lanes, and "share the road" signage. Engineering also includes appropriately reducing the speed of motorized traffic by introducing traffic calming techniques. Education includes fostering partnerships throughout the town to educate the general public about proper bicycle riding and compatible car driving skills. Enforcement includes working with our police department to help publicize and protect the rights and responsibilities of cyclists, and to better enforce the rules for motorists interacting with vulnerable road users.

The Falmouth Bikeways Committee's Vision of Falmouth in The Year 2020:
Falmouth is a great place to both live and to visit because its bike-friendly culture and infrastructure yield calm roads, clean air, and a healthy populace in a vibrant, sustainable economy.

Goals:

- To engineer the infrastructure of Falmouth to support bicycling for transportation and recreation. A system of well-marked, safe roads and paths make it an attractive place for children and adults to bicycle to their daily destinations. When cyclists arrive at their destinations there are secure facilities to park their bicycles.
- To promote educational and bicycling programs that support public health and tourism, and that reduce air pollution, traffic and parking problems. Bicycling is an integral and appreciated part of the community culture.
- To foster safe, informed, and respectful interactions among people who walk, drive bicycles and cars on Falmouth's roads and paths. Drivers and cyclists understand their respective responsibilities, and police support both through enforcement and education.



The following tables present a summary of recommendations developed by the committee to address bicycling needs in Falmouth. Corresponding maps are shown in Figures 14 and 15. Estimated costs are listed when available from the Falmouth DPW/Town Engineer or estimated by the Cape Cod Commission. Appendix C includes a table listing unit costs for reference.

Table 1 – Overall Ranking of Recommended Projects

Rank	Location	Description	Responsibility	Cost x \$1,000
1	Shining Sea Bikeway Extension to Cape Cod Canal in Bourne	Endorse the construction of a shared use path adjacent to or on existing rail bed from Route 151 to Bourne Canal bikepath [7.5 mi]	Town/ MassDOT	
2	Goodwill Park Rd/Rt 28 intersection	Solar-powered crossing lights to improve safety; improve signage (currently blocked from view)	MassDOT	21
3	Shining Sea Bikeway Connector-Katherine Lee Bates Rd/Rt 28 intersection	Solar-powered crossing lights to improve safety; improve signage (currently blocked from view)	MassDOT	21
4	Goodwill Park Rd/ Gifford St intersection	Install crosswalk as part of proposed East-West Connector	Town	2
5	Dillingham Rd from Gifford to Davis Straits	Install bike lanes or widened shoulder [0.6 miles]	Town	300
6	Dillingham Av from Hamlin Av to Gifford St	Install bike lane [0.1 mi]	Town	2
7	Town land between Goodwill Park Rd and Brick Kiln Rd	Install bike path on town land [1.1 miles]. Widen sidewalk to 10' on Gifford St Extension between Brick Kiln Rd & Old Campus Dr [0.6 miles]	Town	1,259
8	Brick Kiln Rd from Route 28A to Ox Bow Rd	Construct bike path/lanes [3.5 miles]	Town/ MassDOT	2,680
9	Katherine Lee Bates Rd from Rt 28 to Shivericks Pond area	Widen sidewalk for multi-use, include access to Mullen Hall & Lawrence schools [0.5 mile]	Town	250
10	Thomas Landers Rd from Steamship parking to Shining Sea Bikeway	Construct bike path/lanes [1.2 miles]	Town/ MassDOT	919



11	Land between Trotting Park Fields to Trotting Park Rd	Develop right of way on town land. Construct multi-use path [630 ft]	Town	60
12	Bike path from end of Alphonse St into Teaticket School	Repave bike path [750 feet]	Town	27
13	Rt 28 at Metoxit Rd & Spring Bars Rd intersections	Re-mark pavement markings at crosswalks	MassDOT	2
14	Rt 28	Accommodate bikes from downtown to Mashpee line	MassDOT	
15	Rt 28 Main St	Improve Bicycle accommodations in downtown area	Town	
16	Shining Sea Bikeway from Woods Hole to Downtown	Reconstruct & overlay	Town (Env. Bond Bill)	900
17	Locust St & Woods Hole Rd from Rt 28 to Woods Hole	Construct wide sidewalk [3.7 miles]	MassDOT	2,442
18	Thomas Landers Rd from Steamship parking area to Sandwich Rd	Construct bike path/lanes [2.2 miles]	Town/MassDOT	1,684
19	Steamship Authority parking lot in Woods Hole	Improve pavement markings and signs designating bikeway through parking area [0.6 miles]	Town/Steamship Authority	6
20	Rt 28 from Seacoast Shores Blvd to Childs River Rd	Construct wide sidewalk [0.3 miles]	MassDOT	198
21	Bike route from north end of Shining Sea Bikeway to Town of Bourne	Install bike route signs (Claire Saltonstall realignment) via County Rd, Garnet Av [1 mile]	MassDOT/Town	1
22	Rt 151 from Shining Sea Bikeway to Mashpee town line	Install bike lanes or widened shoulder [4.9 miles]	MassDOT	2,458
23	Parcels between Maravista Av and Rose Morin Ln	Work with Falmouth Housing Authority to consider connection between Rose Morin Ln and Morin Av and from Ocean State Job Lot parking to Maravista Av	Town	
24	Falmouth Bus Depot	Construct covered bike parking	Town/EDIC	

*Table 2 - Ongoing/Annual Recommendations*

Location	Description
Shining Sea Bikeway - maintenance	Add maintenance line item to annual DPW budget
Town-wide - Road resurfacing projects	Narrow travel lanes to calm traffic, and increase shoulder width to accommodate non-motorized transport
Town-wide – Bicycle safety signage and sharrows	Include “Bicycles may use full lane” signage and pavement markings on roads (esp. at sharp curves and where bike shoulders/lanes do not exist)
Town-wide – Multi-Use Paths	Consider creation of multi-use paths
Town-wide - Education	Bicycling education program (see text of report)
Falmouth Police Department	Work with Falmouth P.D. for improved enforcement of speed limits, road sharing rules, crosswalk usage, oversight of Shining Sea Bikeway
Menauhant Road, Surf Drive	Remove sand from shoulders
Town-wide - Crosswalks	During roadway maintenance, improve crosswalk markings to “piano key” style
Install bike racks at locations throughout town	Town-wide – Bike Racks
Town-wide – Wayfinding Signage	Install wayfinding signs throughout town to guide cyclists to points of interest and best routes

Strengthening Falmouth’s bicycling environment and realizing the comprehensive vision of this Plan depends upon commitments by the Town and multiple supporting partners, both governmental and private. The Plan includes recommended actions for implementing the engineering, education, and enforcement priorities identified by the committee.

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Introduction/Background

As part of an effort to enhance its quality of life and economic activity, the town of Falmouth is seeking to provide safe and effective bicycle facilities to all parts of town. This includes planning for the most appropriate ways in which to accommodate cycling within the overall transportation system in order for those who ride bicycles to safely, conveniently, and comfortably access every destination within the town. Falmouth is fortunate to have the Shining Sea Bikeway (SSBW), a destination in itself for tourists and locals alike. Creating safe and effective links between the villages of Falmouth, the SSBW, and other important destinations in town is a high priority in this Bike Plan. Secondarily we endorse and support the development of an extension of the SSBW through Bourne to meet the Cape Cod Canal Bikeway, and to provide links to Cape Cod's growing network of designated bicycle routes including the Claire Saltonstall Boston to Cape Cod route, extensions of the Cape Cod Rail Trail and the proposed East Coast Greenway.



Figure 1 - Along the Shining Sea Bikeway between Surf Drive and Woods Hole

STUDY GOALS

The Cape Cod Commission has conducted a bicycle facilities planning study in coordination with the Falmouth Bikeway Committee for the Town of Falmouth with the following study goals:

- Identify safe and effective bicycle access between North Falmouth, Hatchville, East Falmouth, Waquoit and Falmouth Village.



- Identify safe and effective bicycle access between the Shining Sea Bikeway and the villages of Falmouth.
- Coordinate this planning effort with the Regional Transportation Plan, the Cape Cod Bike Plan, Falmouth's Route 28/Main Street Transportation Master Plan, and the Local Comprehensive Plan's Transportation Element.

BACKGROUND

The Cape Cod Commission, serving as the regional planning agency for the fifteen towns on Cape Cod, has reviewed transportation issues at many locations over the years during various planning activities, including the Regional Transportation Plan, the Transportation Improvement Program, and Developments of Regional Impact, considering the existing safety issues and potential improvements.

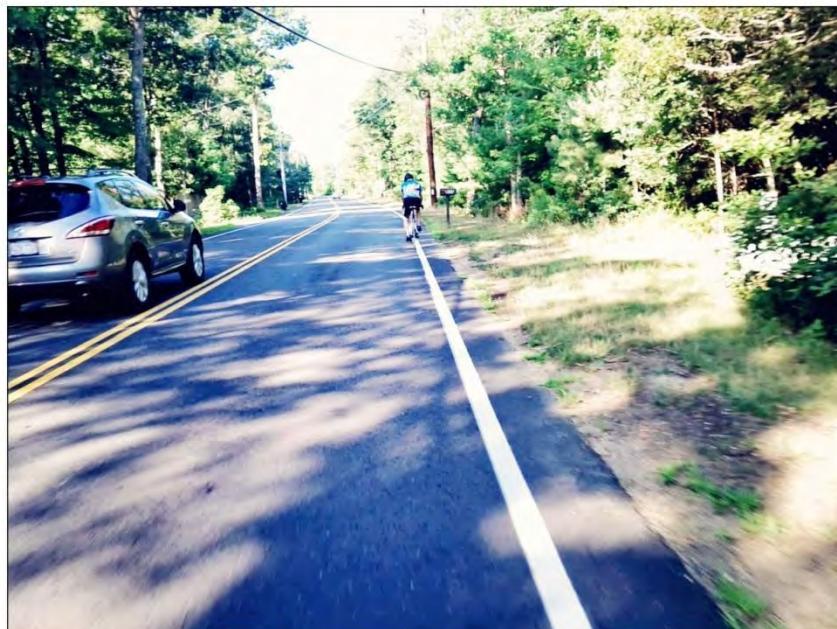


Figure 2 - Along County Road in North Falmouth

According to the United States 2010 Census, Falmouth has an estimated population of 31,531, making it the 2nd most populous town in Barnstable County. Falmouth ranks 2nd in employment with 14,280 employees according to the U.S. Bureau of Labor Statistics.

During the development of this study, the Town of Falmouth has undertaken a "Route 28/Main Street Transportation Master Plan." Issues being addressed in this effort include:

- Traffic Circulation
- Signing
- Truck Routing
- Parking
- Intersection Operations



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- Pedestrian and Bicycle Accommodations
- Handicap Accessibility/Accommodations

Consultants for the Transportation Master Plan have been and will continue to be informed on the progress of the 2015 Bike Plan.



Figure 3 - Mountain bike trails on land preserved from development in Falmouth

BIKEWAYS IN FALMOUTH

As a starting point, the town of Falmouth has produced a bikeways map (shown in appendix A). More detail can be seen by viewing of the map from the town of Falmouth's website: <http://www.falmouthmass.us/gis/falmouthbikewaysmap.pdf>

The map shows many points of interest including:

- Beaches
- Bike Racks
- Bike Shops
- Ferries
- Food Stores
- Lighthouse
- Parking
- Toilets

Bikeways include:

- Shining Sea Bikeway
- Bike Route
- Bike Route\Caution



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The map also shows areas of sidewalks, streams, and ponds. Also included in appendix A is a bike map produced by the Friends of Falmouth Bikeways, a local biking advocacy group.



Figure 4 - Along the Shining Sea Bikeway at the intersection of Surf Drive



Figure 5 Along the Shining Sea Bikeway near Great Sippiwissett Marsh



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BICYCLE CRASH HISTORY

According to the most recently available 3-year period (2010-2012) crash records provided by MassDOT, there were 2,409 crashes of all types reported for the town of Falmouth, the highest reported for any town on Cape Cod. (Barnstable was second with 2,266 reported crashes).

Of these 2,409 crashes forty-three were reported to include bicyclists. Forty-two of the 43 reports included location information and these are shown in the following figure. Eight of the bicycle crashes were “property damage only” (shown as orange circles), and thirty-five involved injuries (shown as red circles). No fatalities were reported.

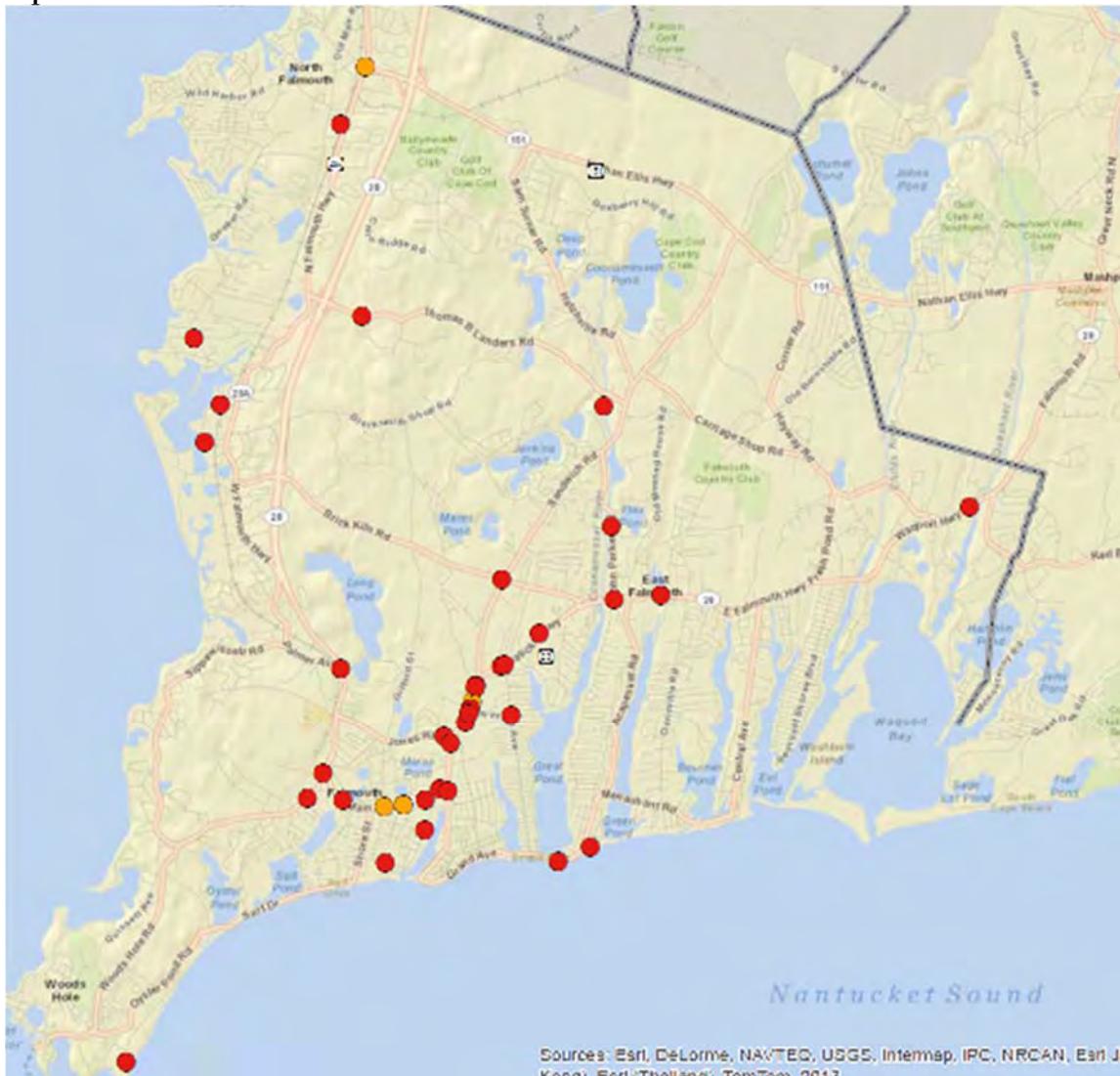


Figure 6 - Reported Bicyclist Crashes

Based on MassDOT Crash Reports 2010-2012



Problem Identification – Bicycle Routing

The Plan for Improved Transportation Network for Bicycling in the Town of Falmouth is the product of more than a year's work and seeks to make the town a safe and enjoyable place for bicyclists. In the spring of 2014 the Falmouth Bikeways Committee conducted an on-line survey, and then hosted a public workshop during the summer of 2014. Workshop participants were tasked with identifying desired bicycle routes (mostly on-street) and destinations. The condition of the desired routes was included, and in some cases the routes were identified to be "problem areas." This information is presented in the maps on the following pages and is summarized in the following sections.

In late summer 2015 The Falmouth Bikeways Committee and Cape Cod Commission reached a milestone as they worked to advance a new bike transportation plan for the town. At a September 2nd 2015 meeting at Falmouth Public Library, the Bikeways Committee and staff from the Cape Cod Commission presented the draft plan's highlights and gathered input from a packed room of more than 100 engaged attendees. The bulk of the presentation was devoted to outlining and discussing a ranked list of 24 priority bicycling infrastructure improvements, developed jointly by the Bikeways Committee and transportation professionals at the Cape Cod Commission. During the second half of the meeting, participants had the opportunity to browse the priority list in poster format and "vote" by placing sticky dots beside their top priorities for improvements.

Meeting participants, who spanned a range of age groups and parts of Falmouth, displayed a deep interest in improving bicycling conditions throughout town and provided a variety of constructive comments and questions. These public meetings represented key steps in a broader process, which includes finalizing the draft plan, presenting it to the Board of Selectmen for adoption, and, ultimately, using it to guide the town's public policy and budget decisions. At the meeting's conclusion, the public was encouraged to email any further comments to the committee for consideration in the draft plan revisions.

After the September 2015 meeting, the Bikeways Committee tallied and ordered the public's priority project choices. The committee considered these desires when revising their ranked list of priority projects to accompany this final Plan which are listed in Table 3.

Destinations

Dozens of destinations have been identified by the committee falling in the following categories:

- Schools
- Libraries
- Beaches
- Ferry ports/public transportation
- Major employers
- Parks
- Cultural centers
- Shopping areas



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- Recreation center/sports fields
- Houses of worship
- Food purveyors

Specific destinations within some of the major categories are as follows and are shown on the following map as a circular blue ● symbol.

Schools:

- Falmouth High School
- Lawrence School (Grades 7-8)
- Morse Pond School (Grades 5-6)
- East Falmouth School (Pre-Kindergarten to Grade 4)
- Mullen-Hall School (Kindergarten to Grade 4)
- North Falmouth Elementary School (Pre-Kindergarten to Grade 4)
- Teaticket Elementary School (Pre-Kindergarten to Grade 4)
- Falmouth Academy

Beaches:

- Megansett Beach
- Old Silver Beach
- New Silver Beach/Wild Harbor
- Chapoquoit Beach
- Wood Neck Beach
- Grew's/Long Pond
- Surf Drive Beach
- Falmouth Heights Beach
- Stoney Beach
- Bristol Beach
- Menauhant Beach

Libraries:

- Falmouth Main Public Library
- Marine Biological Laboratory & WHOI Library
- Woods Hole Public Library
- Falmouth Historical Society Museum & Library
- West Falmouth Library
- East Falmouth Library
- North Falmouth Library

Ferries & Public Transportation

- Steamship Authority (Woods Hole)
- Island Queen (Falmouth Inner Harbor)
- Falmouth & Woods Hole Bus Stations

Recreational

- Gus Canty Community Center/Commodores' Field
- Trotting Park Fields
- Beebe Woods



- Goodwill Park
- 300 Committee and Salt Pond Bird Sanctuary properties

Cultural/Historic/Scenic

- Museums on the Green
- The Knob (start of walking path)
- Nobska Light
- Highfield Hall
- Spohr Gardens

Educational

- Marine Biological Laboratory
- National Marine Fisheries Aquarium
- Sea Education Association
- Waquoit Bay National Estuarine Research Reserve (WBNERR)
- Woods Hole Research Center
- Woods Hole Oceanographic Institute

Municipal/Government

- Falmouth Town Hall
- Falmouth District Court
- Falmouth (Main) Post Office
- Teaticket Post Office
- West Falmouth Post Office
- East Falmouth Post Office
- Falmouth Service Center

Routes

From the results of the August 2014 public design workshop, the Bikeways Committee identified a comprehensive network of bicycle routes throughout the town suitable for a range of cycling ability, as shown in Figures 8 and 9 with the following symbols:

- Novice (green)
- Intermediate (yellow)
- Experienced (red)

In addition, a proposed “East-West” connector route from the Shining Sea Bikeway to Maravista Avenue Extension in the vicinity of Teaticket Elementary School is shown as a line of black dots.

The existing and proposed rerouting of the Claire Saltonstall Boston to Cape Cod route is shown in purple as is the Shining Sea Bikeway.

Problem Intersections

A number of locations where routes cross major roadways introduce difficulties to cyclists, usually because of higher-speed and heavier traffic. Falmouth has five of the top 50 worst intersections on Cape Cod according to MassDOT’s ranking of crash histories. All of those intersections cross Rt. 28, and like those listed below, are in



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need of blinking warning lights that can be activated by pedestrians and bicyclists to alert automobile drivers:

- Goodwill Park
- Katherine Lee Bates Road's bike connector
- Trotting Park Road
- Metoxit Road
- Dillingham Road
- Palmer Avenue at North Main Street



*Figure 7 - Crossing Woods Hole Rd on the Shining Sea Bikeway near Locust St.
Recently installed flashing beacon improves safety*



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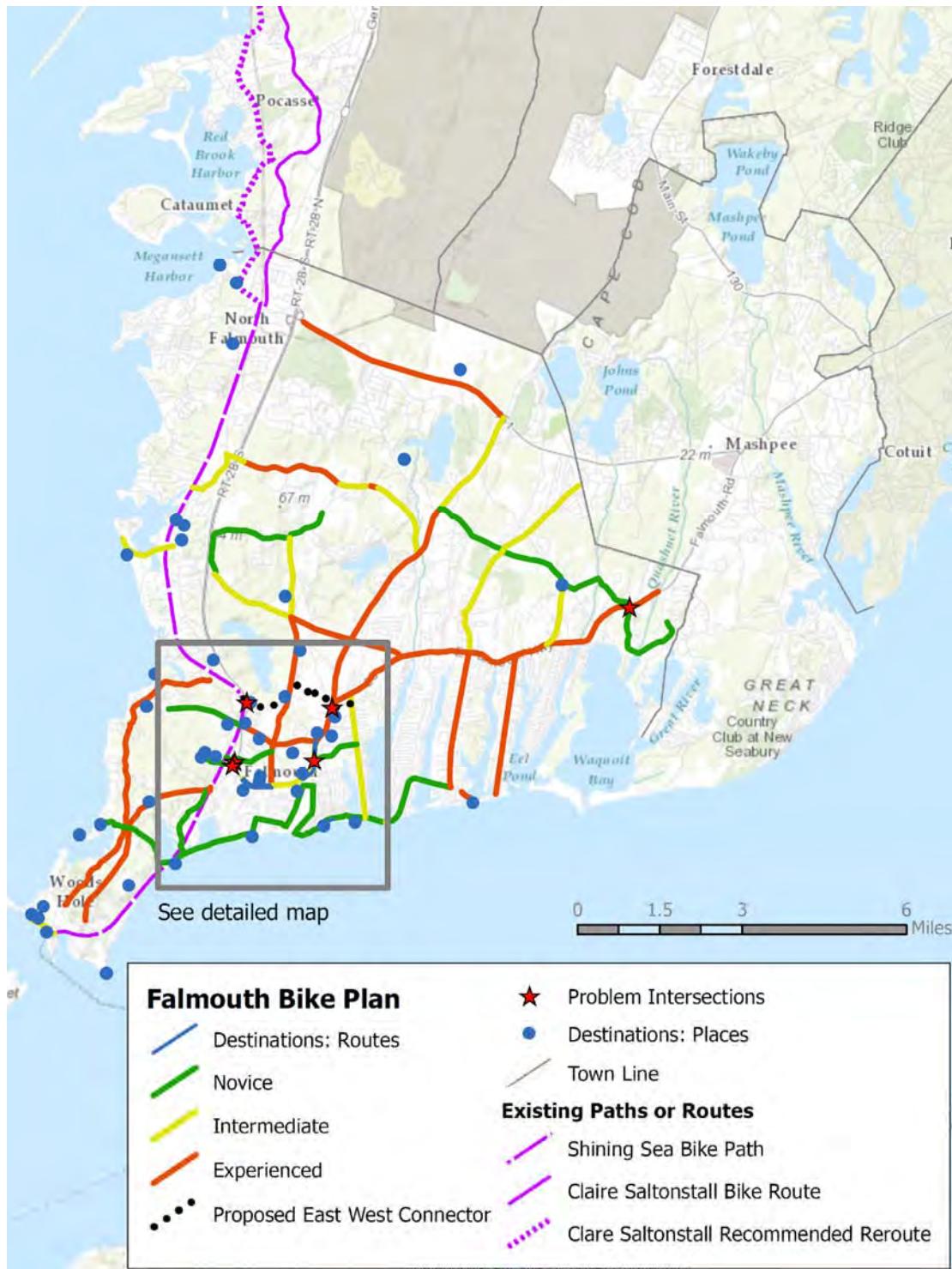
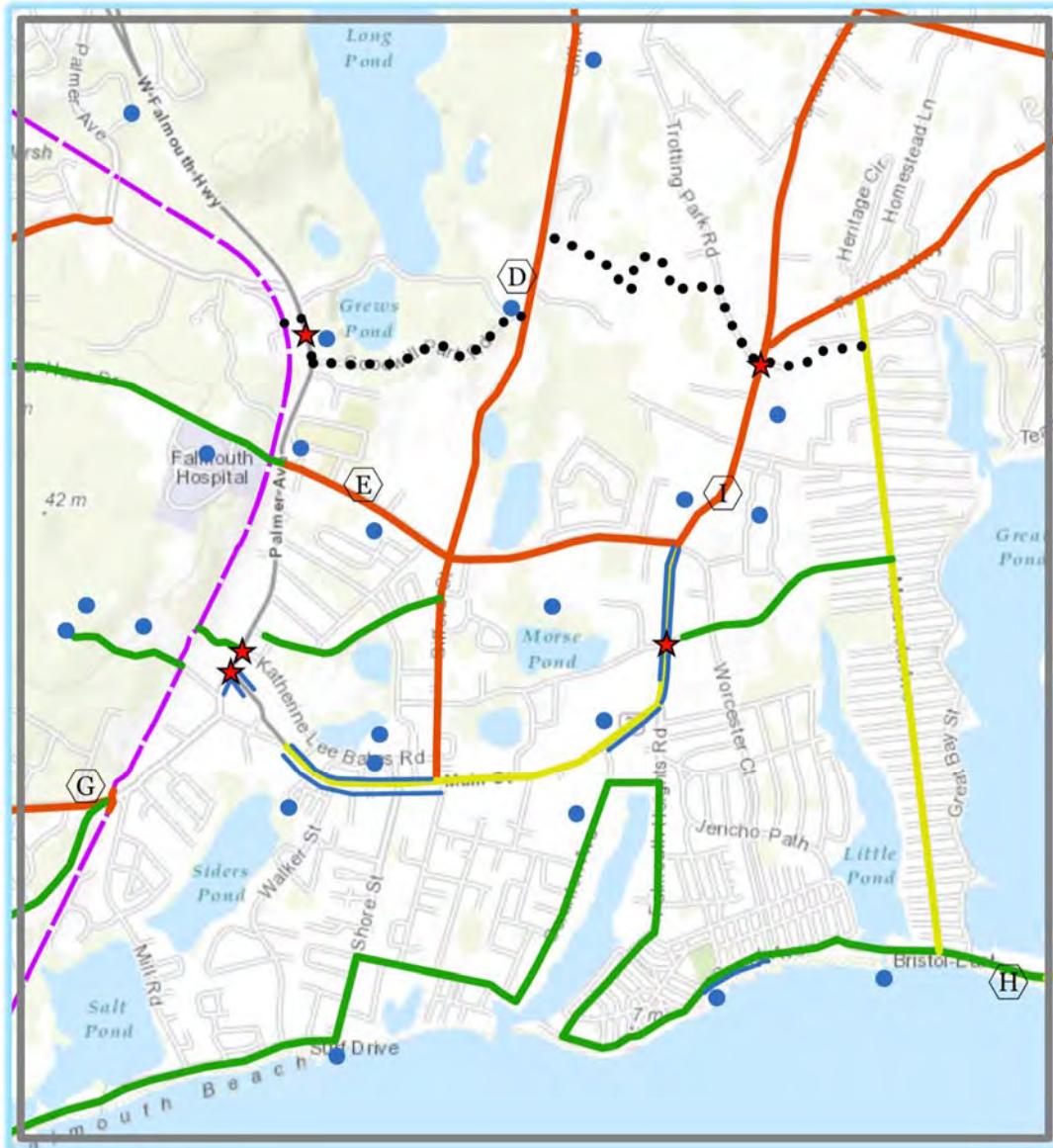


Figure 8 - Destinations, Desired Routes and Problem Areas

The following figure shows a detailed view of the “Destinations, Desired Routes and Problem Areas” in the downtown area.



Falmouth Bike Plan

- Destinations: Routes
- Novice
- Intermediate
- Experienced
- Proposed East West Connector

★ Problem Intersections
 ● Destinations: Places
 ◻ Notes

Existing Paths or Routes

- Shining Sea Bike Path
- Claire Saltonstall Bike Route
- Claire Saltonstall Recommended Reroute

Figure 9 - Falmouth Center Destinations, Desired Routes, Problem Areas and Notes

**Problem Areas**

Many of the desirable routes and a few other roadways as well have been classified by the committee as “problem areas” due to lack of bicycle-accommodation (e.g., shoulders) combined with higher vehicle speeds or heavy traffic volumes.

As part of efforts to identify difficult areas for bicyclists, the Falmouth Bikeways Committee included a number of notes listed in Table 3 and identified on the following maps.

Table 3 - Problem Area Notes

Note #	Location	Comment	Potential Countermeasures
A	Route 151	>16,500 vehicles /day use this road at high speed in off season	Bike shoulders/lanes (separated) to connect to Mashpee path
B	Thomas B. Landers Rd	Heavy industrial truck traffic >3,600 vehicles/day	Bike shoulders/lanes (separated, connect to SSA short term; entire length long-term)
C	Brick Kiln Rd	>5,000 vehicles /day	Bike shoulders/lanes
D	Gifford St	High speed - 45 mph Average of >9,000 vehicles /day in off season	Bike shoulders/lanes Separate bike facility
E	Jones Rd	Average annual traffic >11,000 vehicles /day	Bike shoulders/lanes
F	Sippewissett Rd	Narrow winding road Average daily traffic ~ 1,600 vehicles/day Unenforced 25 mph speed limit	Sharrows Bike shoulders/lanes Periodic speed enforcement
G	Woods Hole Rd	>8,000 vehicles/day	Bike shoulders/lanes Wide sidewalk
H	Menauhant Rd, Surf Drive	Sand often piles up on roadway	Regular sweeping & maintenance
I	Route 28 east of Jones Rd	>16,000 vehicles/day in off season >21,000 vehicles/day in summer	Bike shoulders/lanes Separate bike facility Wide sidewalk
J	Route 28 east of Central Ave	Eastbound cyclists have difficult left turn into Fresh Pond Rd	Add crosswalk
K	Route 28 near Childs River	Need sidewalk	Construct sidewalk
L	Sandwich Rd	High speed and heavy traffic, many curb cuts	Wide sidewalk
M	Steamship parking area in Woods Hole	Poor signage & circulation pattern for bikeway through parking area and connector road	Work with Steamship Authority during planning phase for renovations to develop safer, less confusing circulation

Sources: Cape Cod Commission traffic counts, field observations by committee members.



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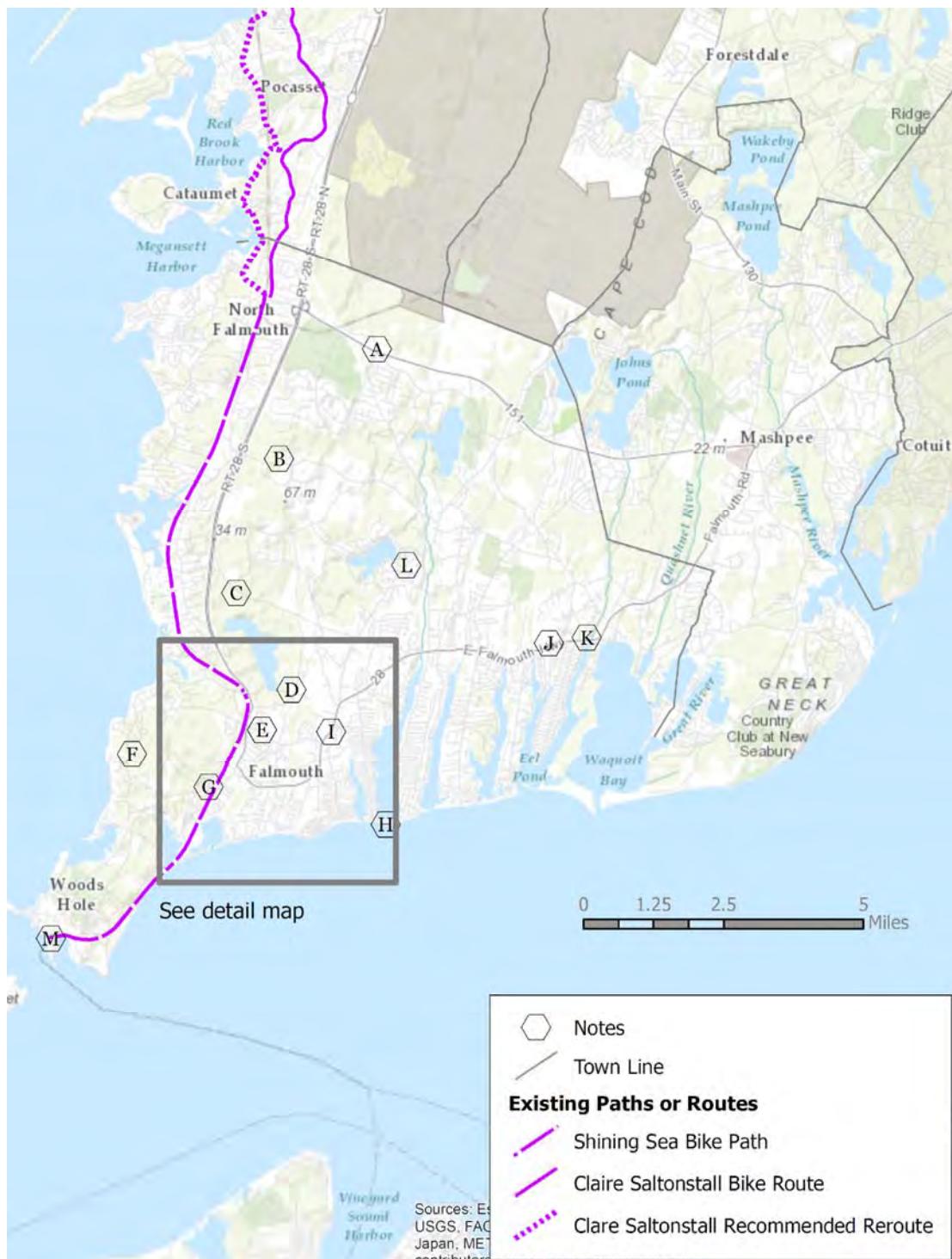


Figure 10 - Problem Area Comments Map - Index of Noted Locations



Recommendations



Figure 11 - View of Shining Sea Bikeway at Falmouth Bus Depot

Improving bicycling in a community such as Falmouth focuses on the “Three E’s”: engineering, education, and enforcement. These three components form a comprehensive whole, functioning independently while reinforcing one another to strengthen Falmouth’s bicycling environment.

The first, **Engineering**, includes physical changes in infrastructure such as the creation of bike lanes and paths, improved signage and road markings (i.e. crosswalks, sharrows), and improved road surface conditions (i.e. free of sand, potholes, and obstructions). Good engineering supports education and enforcement.

Potential engineering improvements are discussed within the tables on the following pages. The tables present alternative methods for accommodating cyclists including dedicated on-street facilities (e.g., bike lanes, blinking lights at major crossings), off-street shared paths, designated bike routes, and other strategies.

The second “E,” **Education**, provides opportunities for residents and visitors to learn the rules of the road, particularly concerning the interaction of bicyclists, vehicle operators, and pedestrians, so that people using Falmouth’s streets, bike paths, and sidewalks have respectful, safe interactions. Education can take many forms – both formal and informal – and is directed at all segments of Falmouth’s population, reaching everyone from children to seniors in a variety of locations, including a web presence.

Enforcement, the third “E,” is in many ways intended to be an extension of education. Ideally, a police officer who witnesses motorized vehicle and/or bicycling infractions can take the opportunity to inform the transgressor of their wrongdoing with positive future outcomes. For witnessed grievous and dangerous incidents,

enforcement is critical to discourage future occurrences. The Bikeways Committee is committed to forming a partnership with the Falmouth Police Department to foster training programs to inform all of the rules and rights of cyclists on roadways. The Committee also seeks the Police Department's proactive cooperation in enforcing speed limits and mobilizing radar speed-warning road-side trailers, and educating the public about road and bike path etiquette, as well as enforcing bicycle helmet laws and bicycling infractions with appropriate warnings and tickets.

EDUCATION

The following is a list of recommendations for implementing a comprehensive bicycling education program in Falmouth.

- Create and make available at all times and relevant locations (Shining Sea Bikeway, Town Hall, Chamber of Commerce, hotels and accommodations, libraries, schools, etc.) posters, internet content, and brochures regarding multi-use path regulations and rules of the road for bicyclists, pedestrians, and motor vehicle operators. For example, see <http://bit.ly/1QAwDPr>
- Hold an annual town-wide bike/walk to work day and bike/walk to school day
- Host an annual bike celebration that features bicycle education, food, tune-ups, group rides and general merriment
- Host an annual bike forum that brings together various stakeholders to discuss best practices for educating people about bicycles
- Hold an educational and community-building event that reaches out to summer residents and visitors
 - Coordinate public education presentations and discussions about sharing the road and multi-use of the Shining Sea Bikeway at schools, senior center, houses of worship, libraries, Newcomers' Club, village associations, etc.
- Participate in state and national Bike Month activities each May
 - Organize programs of education and enforcement in collaboration with Falmouth Police Department.
- Introduce public education specific to use and rules of the Shining Sea Bikeway, both on- and off-site
- Create bicycling educational videos for Falmouth Community TV
- Foster partnerships between private organizations such as the Friends of Falmouth Bikeways, the Falmouth Bike Lab and town entities such as the Bikeways Committee, Traffic Advisory Committee, Falmouth Schools, and Falmouth Police Department.
- Provide financial support for bicycle education and encouragement programs within Falmouth Public Schools
 - Apply for grants to support specific events and long-term educational programs among students and the adult population
 - Hold film screenings about bicycling or establish an annual bike film festival



- Find ways to encourage and support Falmouth's bike-to-school programs, Safe Routes to Schools initiatives, and a community bike shop and education center like the Falmouth Bike Lab.

ENGINEERING: BICYCLE ACCOMMODATION TECHNIQUES

Bicycling can be accommodated to varying degrees by utilizing existing infrastructure and harnessing resources that improve bicycling in the community –ranging from separate facilities (multi-use paths) to policy-level actions (“share the road” educational campaigns) that require little or no capital investment.

The MassHighway (MassDOT) Design Manual includes guidance on the types of accommodation needed based on factors such as traffic volume, available right-of-way, and travel speeds. This guidance is provided in the figures in appendix B.

An example of a specific treatment available for bicycle accommodation is installation of shared lane pavement marking known as a “Sharrows” (shared + arrow). The Sharrows indicate the safe positioning of bicyclists in the travel lane (away from doors opened by parked motorists). The Sharrows also alerts motorists of the likely presence of cyclists. Sharrows are widely in use in Boston and suburbs. They have been installed in Provincetown and Falmouth and are under consideration by other Cape Cod communities (Figure 12).



Figure 12 - "Sharrows" Pavement Marking

In some locales in the US, a vehicle travel lane has been re-designated for bicycle use. In the figure below, a street in Minneapolis has been modified by pavement markings to provide a two-way bike path. Sometimes, two-way traffic on parallel main streets are converted to one-way each way to provide for safer and calmer motorized and non-motorized transportation.



Figure 13 - Conversion of Motor Vehicle Lane to Bicycle Path in Minneapolis

The most comfortable bicycle accommodation technique is the construction of a multi-use path such as the existing Shining Sea Bikeway. By having a dedicated space for pedestrians, bicyclists, and other trail users, interactions with motor vehicles are minimized.

No matter which roadside accommodation is selected, bicyclists may face a daunting situation when confronted with crossing a busy road. At crosswalk locations bicyclists have the option of dismounting and crossing as pedestrians. This is often the safest method, especially at signalized locations that do not have dedicated bicycle lanes.

The recently installed flashing beacon at the intersection of the Shining Sea Bikeway and Locust Street is a good example of a safe mid-block crossing. Cyclists, pedestrians, and other trail users can activate the flashing beacon via a push-button to alert motorists of their presence. At crossings of the Cape Cod Rail Trail in North Harwich and in Eastham flashing beacons are activated by bicycles or pedestrians moving towards the crossings. In this situation, it is important that false activations are avoided, since that would likely lead to decreased motorist compliance.

In addition to crossings and pathways, infrastructure should provide guidance to bicyclists of the best routes available to them via wayfinding signs. Our recommendations include installing signage following standards in Appendix D.



Engineering Recommendations: Tables and Maps

Following the overall development of recommendations with input from public meetings, the Bikeways Committee was tasked with ranking them. Initially, individual members each developed a list of ranked projects. By assigning a value of 24 to the 1st ranked project to a low of 1 for the 24th ranked project, a consensus ranking was developed by combining the scores of the individual lists. This list was then discussed and adjusted by the Committee. Table 4 presents the overall ranking of projects and an associated timeframe for implementation. Table 5 shows important recommendations to be implemented in an ongoing/annual basis.

Table 4 - Overall Ranking of Recommended Projects

Rank	Location	Description	Responsibility	Cost x \$1,000
1	Shining Sea Bikeway Extension to Cape Cod Canal in Bourne	Endorse the construction of a shared use path adjacent to or on rail bed from Route 151 to Bourne Canal bikepath [7.5 mi]	Town/MassDOT	
2	Goodwill Park Rd/Rt 28 intersection	Solar-powered crossing lights to improve safety; improve signage (currently blocked from view)	MassDOT	21
3	Shining Sea Bikeway Connector-Katherine Lee Bates Rd/Rt 28 intersection	Solar-powered crossing lights to improve safety; improve signage (currently blocked from view)	MassDOT	21
4	Goodwill Park Rd/Gifford St intersection	Install crosswalk as part of proposed East-West Connector	Town	2
5	Dillingham Rd from Gifford to Davis Straits	Install bike lanes or widened shoulder [0.6 miles]	Town	300
6	Dillingham Av from Hamlin Av to Gifford St	Install bike lane [0.1 mi]	Town	2
7	Town land between Goodwill Park Rd and Brick Kiln Rd	Install bike path on town land [1.1 miles]. Widen sidewalk to 10' on Gifford St Extension between Brick Kiln Rd & Old Campus Dr [0.6 miles]	Town	1,259
8	Brick Kiln Rd from Route 28A to Ox Bow Rd	Construct bike path/lanes [3.5 miles]	Town/MassDOT	2,680
9	Katherine Lee Bates Rd from Rt 28 to Shivericks Pond area	Widen sidewalk for multi-use, include access to Mullen Hall & Lawrence schools [0.5 mile]	Town	250
10	Thomas Landers Rd from Steamship parking to Shining Sea Bikeway	Construct bike path/lanes [1.2 miles]	Town/MassDOT	919
11	Land between Trotting Park Fields to Trotting Park Rd	Develop right of way on town land. Construct multi-use path [630 ft]	Town	60



12	Bike path from end of Alphonse St into Teaticket School	Repave bike path [750 feet]	Town	27
13	Rt 28 at Metoxit Rd & Spring Bars Rd intersections	Re-mark pavement markings at crosswalks	MassDOT	2
14	Rt 28	Accommodate bikes from downtown to Mashpee line	MassDOT	
15	Rt 28 Main St	Improve Bicycle accommodations in downtown area	Town	
16	Shining Sea Bikeway from Woods Hole to Downtown	Reconstruct & overlay	Town (Env. Bond Bill)	900
17	Locust St & Woods Hole Rd from Rt 28 to Woods Hole	Construct wide sidewalk [3.7 miles]	MassDOT	2,442
18	Thomas Landers Rd from Steamship parking area to Sandwich Rd	Construct bike path/lanes [2.2 miles]	Town/MassDOT	1,684
19	Steamship Authority parking lot in Woods Hole	Improve pavement markings and signs designating bikeway through parking area [0.6 miles]	Town/Steamship Authority	6
20	Rt 28 from Seacoast Shores Blvd to Childs River Rd	Construct wide sidewalk [0.3 miles]	MassDOT	198
21	Bike route from north end of Shining Sea Bikeway to Town of Bourne	Install bike route signs (Claire Saltonstall realignment) via County Rd, Garnet Av [1 mile]	MassDOT/Town	1
22	Rt 151 from Shining Sea Bikeway to Mashpee town line	Install bike lanes or widened shoulder [4.9 miles]	MassDOT	2,458
23	Parcels between Maravista Av and Rose Morin Ln	Work with Falmouth Housing Authority to consider connection between Rose Morin Ln and Morin Av and from Ocean State Job Lot parking to Maravista Av	Town	
24	Falmouth Bus Depot	Construct covered bike parking	Town/EDIC	

Each recommendation above is shown by number (and rank) on a town-wide map (Figure 14) and Falmouth Center map (Figure 15).



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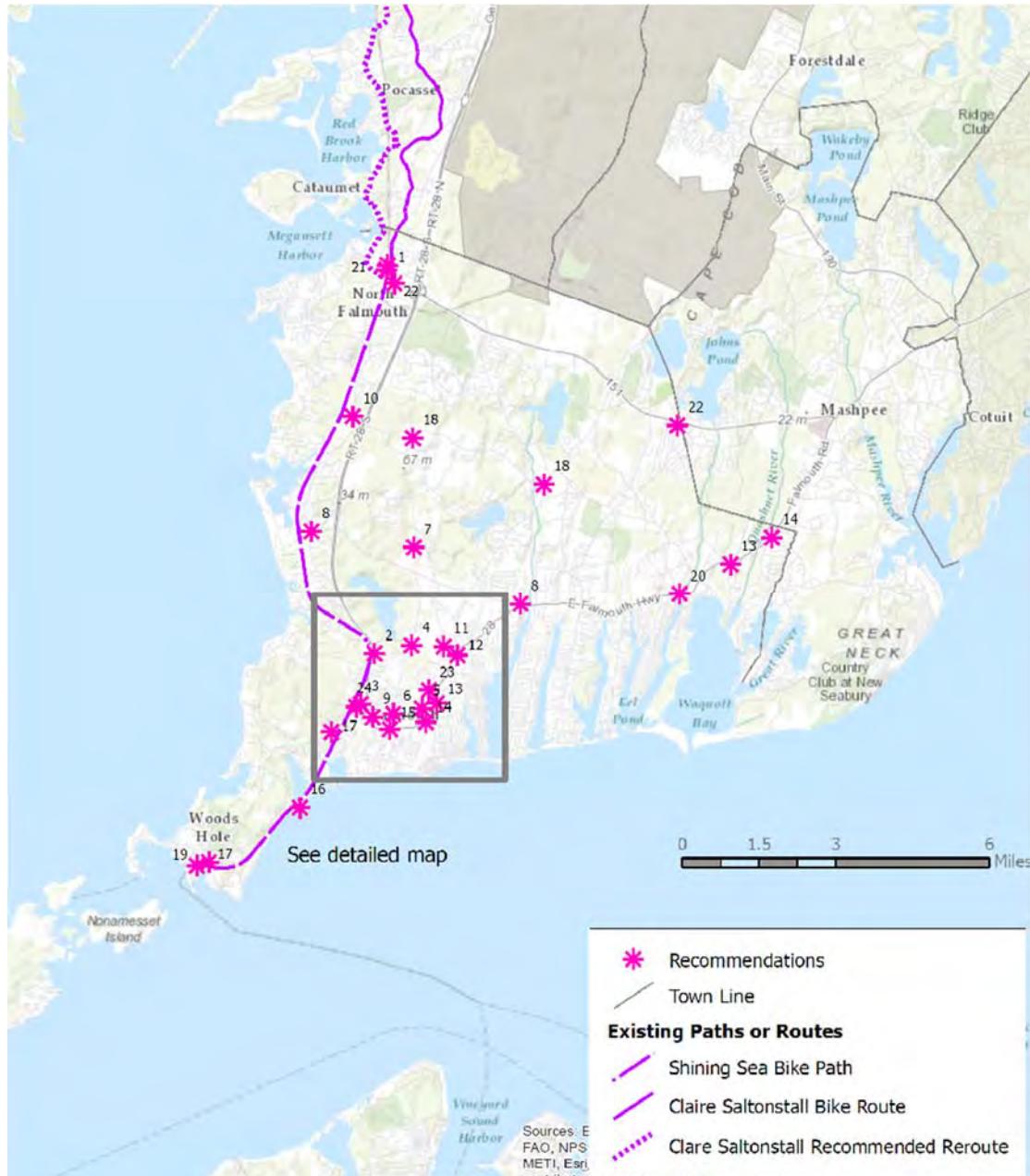


Figure 14 - Recommendations Map - Index of Locations

The following map shows a detailed view of the Recommendations' locations in downtown Falmouth. For reference the Shining Sea Bikeway is shown as a dashed purple line.

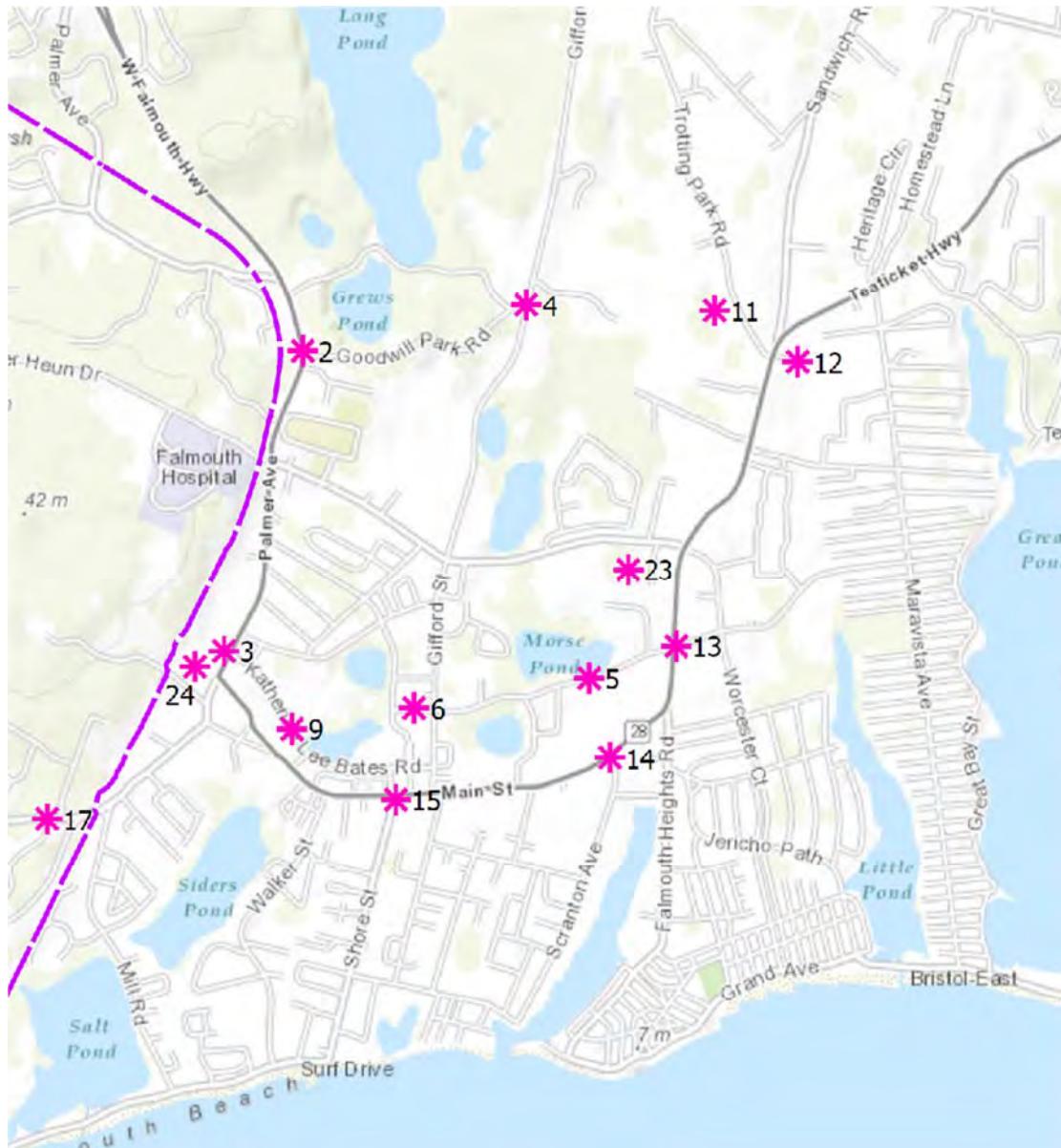


Figure 15 - Falmouth Center Recommendations Map - Index of Locations



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Figure 16 - Bicycle rack and parking lot/Shining Sea Bikeway near Steamship Authority in Woods Hole

The following table presents the recommendations that are to be implemented on an ongoing or annual basis.

Table 5 - Ongoing/Annual Recommendations

Location	Description
Shining Sea Bikeway - maintenance	Add maintenance line item to annual DPW budget
Town-wide - Road resurfacing projects	Narrow travel lanes to calm traffic, and increase shoulder to accommodate non-motorized transport
Town-wide – Bicycle safety signage and sharrows	Include “Bicycles may use full lane” signage and pavement markings on roads (esp. at sharp curves and where bike shoulders/lanes do not exist)
Town-wide – Paths	Consider creation of multi-use paths
Town-wide - Education	Bicycling education program (see text of report)
Falmouth Police Department	Work with Falmouth P.D. for improved enforcement of speed limits, road sharing rules, crosswalk usage, oversight of Shining Sea Bikeway
Menauhant Road, Surf Drive	Remove sand from shoulders
Town-wide - Crosswalks	During roadway maintenance, improve crosswalk markings to “piano key” style
Install bike racks throughout town	Town-wide – Bike Racks
Town-wide – Wayfinding Signage	Install wayfinding signs throughout town to guide cyclists to points of interest and best routes

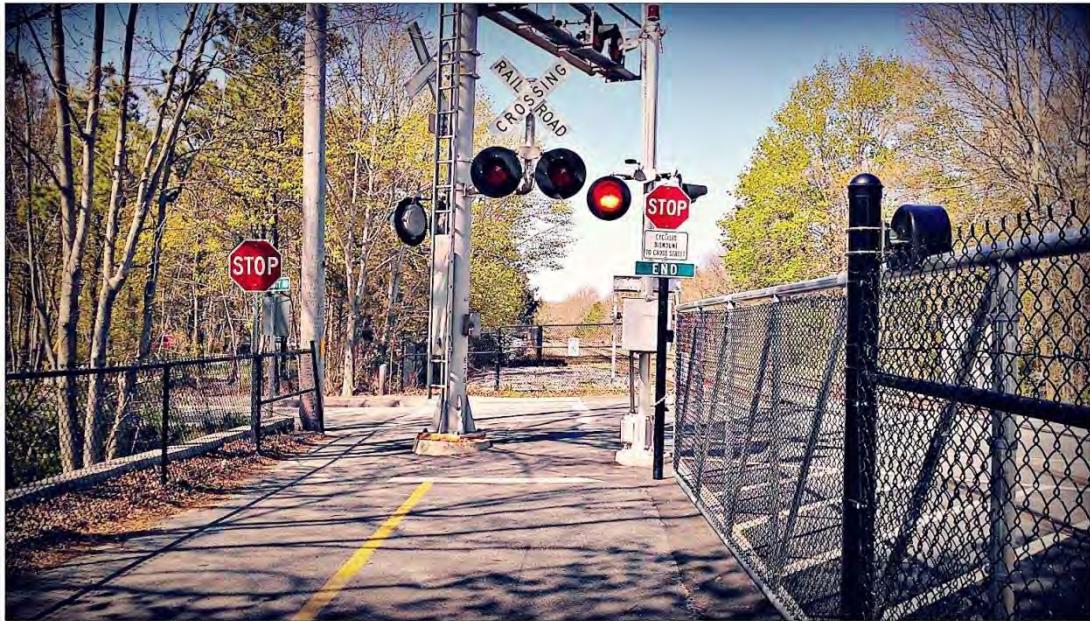


Figure 17 - View of the end of the Shining Sea Bikeway in North Falmouth

IMPLEMENTATION

Strengthening Falmouth's bicycling environment and realizing the comprehensive vision of this Plan depends upon commitments by the Town and multiple supporting partners, both governmental and private. Recommended actions for implementing engineering, education, and enforcement priorities include, but are not limited to:

Establish maintenance & improvement budgets for non-motorized infrastructure
Stable funding is essential for the completion of recurring and non-recurring projects of high priority. This Plan identifies a number of items to improve infrastructure for non-motorized transportation. Funding these items will best be done if maintenance is funded separately from improvements. This could be realized if the budget for the Department of Public Works (DPW) specified that a percentage of budgeted funds be allocated to maintenance of non-motorized infrastructure, including the Shining Sea Bikeway, sidewalks, highway shoulder striping, and pavement repairs. Alternatively, DPW could be directed by Town government to allocate a percentage of its Highways budget to non-motorized facility maintenance.

To address priority bicycling infrastructure improvements, the DPW and Bikeways Committee should be charged with identifying and pursuing funding sources at local, regional, state and federal levels, with assistance from other Town and regional transportation officials as may be needed. Identification of projects to be initiated should require agreement between the Bikeways Committee, in its chartered role as advisor to the Town, and DPW.

Create a Town staff position to lead bike plan implementation

The Town should designate existing staff member(s) or consider hiring a new bicycle and pedestrian coordinator who is responsible for ensuring that Bike Plan implementation occurs in a coordinated and timely manner. Staff member(s) could be part of the DPW, Planning Department, other relevant town departments, or, ideally, coordinate across multiple departments. Chief responsibilities of the staff member(s) should include identifying and applying for project implementation funds, communicating and coordinating planning funding and implementation efforts across departments and committees within and outside the Town as appropriate, leading community outreach including regular public meetings, and compiling data for progress reports, as detailed further in this section.

Capitalize on any opportunities to implement Bike Plan recommendations

Implementing Departments and entities should consider all of the priorities ranked in Table 2 to be deserving of significant attention. For example, the Route 28/Main Street Traffic Plan, and the Local Comprehensive Plan Transportation Element should include and support the Bike Plan's recommendations. The project rankings should be interpreted as a guide, not a strict order for implementation. As funding and other resources align to make it feasible to implement particular projects, funds should be pursued in a strategic and timely fashion, including consideration of bundling or combining projects where possible to speed improvements.

Consult with Town Bikeways Committee to guide bike plan implementation

As the Town's chief community representatives on biking matters, the Bikeways Committee is in a strong position to provide context and guidance on implementing projects recommended by this Plan and otherwise. If, for example, there is debate over which project to pursue with a given amount of available funding, the Town implementing entity should be required to consult the Bikeways Committee for advice and endorsement.

Increase collaboration across Town departments and committees

Completion of Bike Plan recommendations will depend strongly on multiple Town departments and committees being aware of their existence and importance. For example, DPW should take into account bicycling infrastructure when implementing road improvements, as should other Town Departments that could impact bicyclists through planning or construction endeavors.

Collect regular data on town bicycling ridership

The Town should conduct annual or ideally semi-annual (peak and off-peak seasonal) counts of bicyclists at locations throughout the community. Tracking data on year-over-year and seasonal differences in bicycle ridership will help the Town to better understand engineering, education, and enforcement needs over time as well as the success of the Town in attracting bicycling-related tourism. These counts



should be standardized and conducted by Town staff, Bikeways Committee members, or trained volunteers.

Publish annual update on Bike Plan progress

In order to ensure that the Bike Plan remains a living document that reflects the community's needs and uses resources wisely, the Town, with assistance from the Bikeways Committee and DPW, should complete and make publicly available an annual summary of in-progress, completed, and planned non-motorized projects. The update can be a component of the Town Annual Report. It should also include the most recent data on bicycle ridership, roadway incidents, and other relevant metrics as appropriate.

Build awareness and relationships at neighboring town, county and state levels

In addition to collaboration within the Town, successful Bike Plan implementation needs support from other levels of government with ownership over local transportation infrastructure. The Town should seek and maintain intergovernmental relationships to create mutual awareness and support for improvements with implications outside its boundaries.

Collaborate with local organizations to advance the plan's implementation

Local bike advocacy groups, such as Friends of Falmouth Bikeways and the Massachusetts Bicycle Coalition, offer knowledge, enthusiasm, and resources that can prove critical to implementing the recommendations of this plan. Regular communication about Bike Plan progress with these and other relevant groups, including local employers looking to encourage commuting by bicycle, is essential to retaining momentum on implementation.

Hold annual public meeting on Bike Plan progress

In order to keep the community engaged and broaden awareness about bicycling issues, the Bikeways Committee should hold a meeting on an annual basis, or more often as deemed necessary, to update the community on pertinent bicycling issues and progress toward completing priority projects.

Organize group bicycle rides for local employees

It is critical that staff involved in implementing the Bike Plan have a common understanding of existing bike conditions in Falmouth. The Town and/or the Bikeways Committee should organize at least two bike rides or team field visits per year for staff directly or indirectly involved in implementing the Bike Plan to visit sites where plans or action is ongoing or finished. These on-the-ground site visits will lend important perspective to inform engineering, education, and enforcement improvements.

Appendix A: Bikeway Maps



Falmouth Bikeways Map produced by the Town of Falmouth

The following map was created by the Friends of Falmouth Bikeways as a guide for residents and visitors. Produced as a brochure, the map provides information on the most comfortable biking options, destinations, and services.



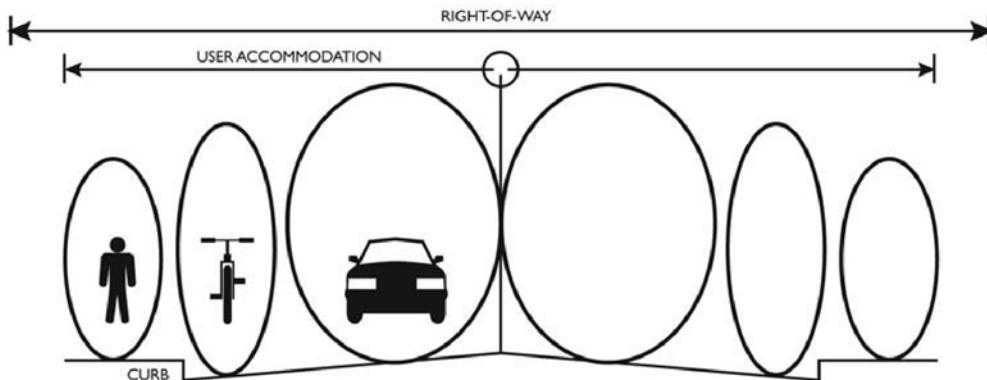
Bike Map Produced by Friends of Falmouth Bikeways

Appendix B: MassDOT Design Guide Bicycle/Pedestrian Accommodation

The following are excerpted from the Massachusetts Department of Transportation's Design Guide. The Falmouth Bikeways Committee has included applications of each case identified with [parentheses](#).

Case 1 - Separate Accommodation for All Users (Bike Lane)

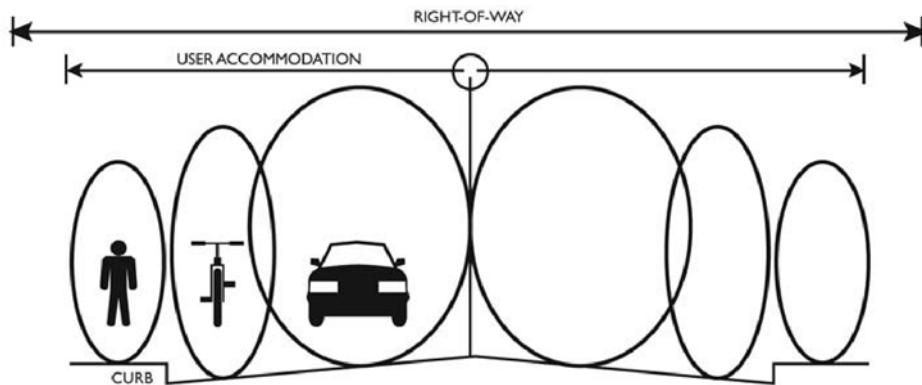
- Often the preferred option to provide safe, convenient, and comfortable travel for all users.
- Appropriate for areas with moderate to high levels of pedestrian and bicycle activity.
- Appropriate for roadways with moderate to high motor vehicle speeds.
- Appropriate in areas without substantial environmental or right-of-way constraints.



MassDOT Design Guide: Case 1 - Separate Accommodation for All Users

Case 2 - Partial Sharing for Bicycles and Motor Vehicles (Wide Shoulder)

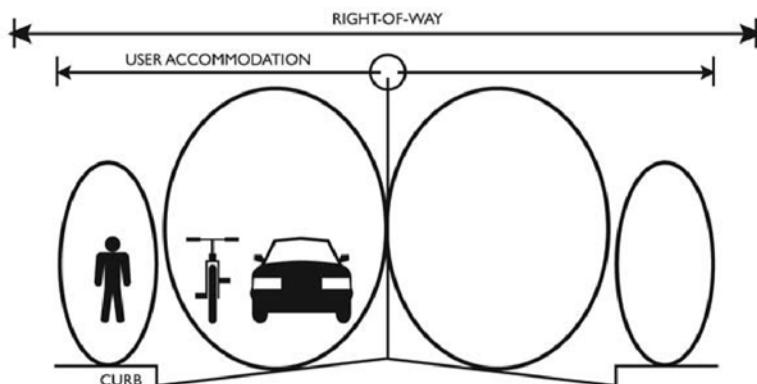
- Used in areas where the width necessary to provide Case 1 accommodation is not available.
- Under Case 2, pedestrians are provided with a sidewalk or separate path while space for bicyclists and drivers overlap somewhat.
- Appropriate in areas with low motor vehicle speeds and low to moderate motor vehicle volumes.



MassDOT Design Guide: Case 2 - Partial Sharing for Bicycles and Motor Vehicles

Case 3 - Shared Bicycle/Motor Vehicle Accommodation (Sharrows)

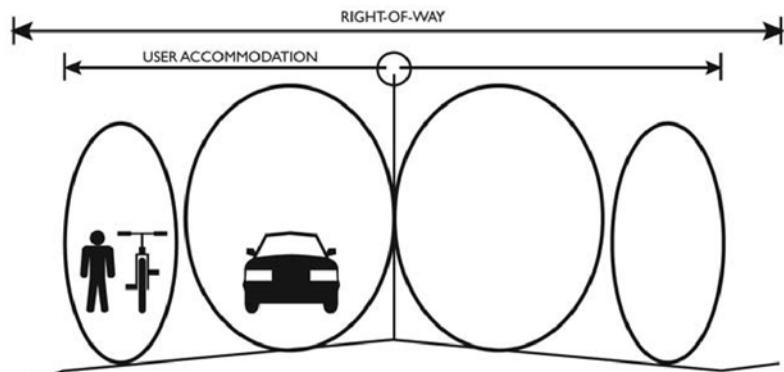
- Under Case 3, pedestrians remain separate but bicycle and motor vehicle space is shared.
- Used in densely developed areas where right-of-way is constrained.
- Also applicable to most residential/local streets where speeds and traffic volumes are low.



MassDOT Design Guide: Case 3 - Shared Bicycle/Motor Vehicle Accommodation

Case 4 - Shared Bicycle/Pedestrian Accommodation (Wide Sidewalk)

- Under Case 4, pedestrians and bicyclists share the shoulder.
- Common in rural or sparsely developed areas.
- Appropriate for areas with infrequent pedestrian and bicycle use.

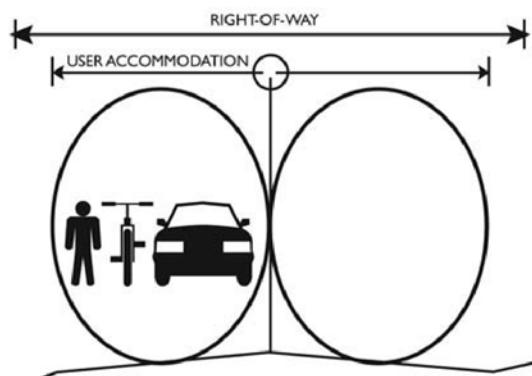


MassDOT Design Guide: Case 4 - Shared Bicycle/Pedestrian Accommodation

The Bikeways Committee has identified wider sidewalks and preferably multi-use paths as strategies for Case 4.

Case 5 - Shared Accommodation for All Users

- Under Case 5, all users share the roadway.
- Appropriate where user demands and motor vehicle speeds are very low or when severe constraints limit the feasibility of providing separate accommodation.



MassDOT Design Guide: Case 5 - Shared Accommodation for All Users

Appendix C: Unit Costs of Improvements

The following table of unit costs of bicycle and pedestrian accommodation techniques was included in the “Bicycle Feasibility Study: Integrated Bicycle Plan for Cape Cod” published by the National Park Service/Cape Cod National Seashore in partnership with the Cape Cod Commission in 2011.

Bicycle & Pedestrian Accommodations Unit Costs

Accommodation	Requirements	Unit	Unit Cost
On-road bikeway	Signing & striping	LF	\$ 2.00
On-road bikeway	Widen existing roadway to provide shoulder/bike lane	LF	\$ 95.00
Off-road bikeway	Construct shared use path adjacent to existing roadway, including utility pole relocation	LF	\$ 145.00
Off-road bikeway	Construct rail to trail path using abandoned railroad bed, minimal grading required	LF	\$ 125.00
Off-road bikeway	Construct shared use path on new alignment	LF	\$ 165.00
Off-road bikeway	Construct shared using existing corridor, minor grading and clearing required	LF	\$ 150.00
Roadway Crossing, residential	Pavement markings, and curb cuts/ADA curb ramps	EA	\$ 1,500.00
Roadway Crossing, signalized	Mast arms, signal heads, pedestrian signals, pavement markings, and curb cuts/ADA curb ramps	EA	\$ 70,000.00
5' Sidewalk, bituminous	Sidewalks located on both sides of street	LF	\$ 120.00
5' Sidewalk, concrete	Sidewalks located on both sides of street	LF	\$ 140.00
Bicycle/pedestrian bridge	Total lump sum construction	LS	\$1,200,000.00
Wayfinding Signage	Complete signage for wayfinding including directional and distance signs, route signs, destinations, etc.	LM	\$ 18,400.00
Bicycle rack (parking)	Installation on existing slab, drill & grout bolts	EA	\$ 1,500.00
Parking lot, trailhead		EA	\$ 50,000.00

Appendix D: Wayfinding

As part of ongoing planning for the revitalization of Falmouth and as an effort to connect parts of Falmouth (for example, points of interest with the Shining Sea Bikeway) the Cape Cod Commission is providing an example of a wayfinding plan (including some graphics originally produced for the town of Harwich).

This section of the report is intended to provide a summary of wayfinding standards, design specifications for wayfinding kiosks and conceptual site plans for placement of signage. The proposed signage program could be integrated into a regional signage plan moving forward.

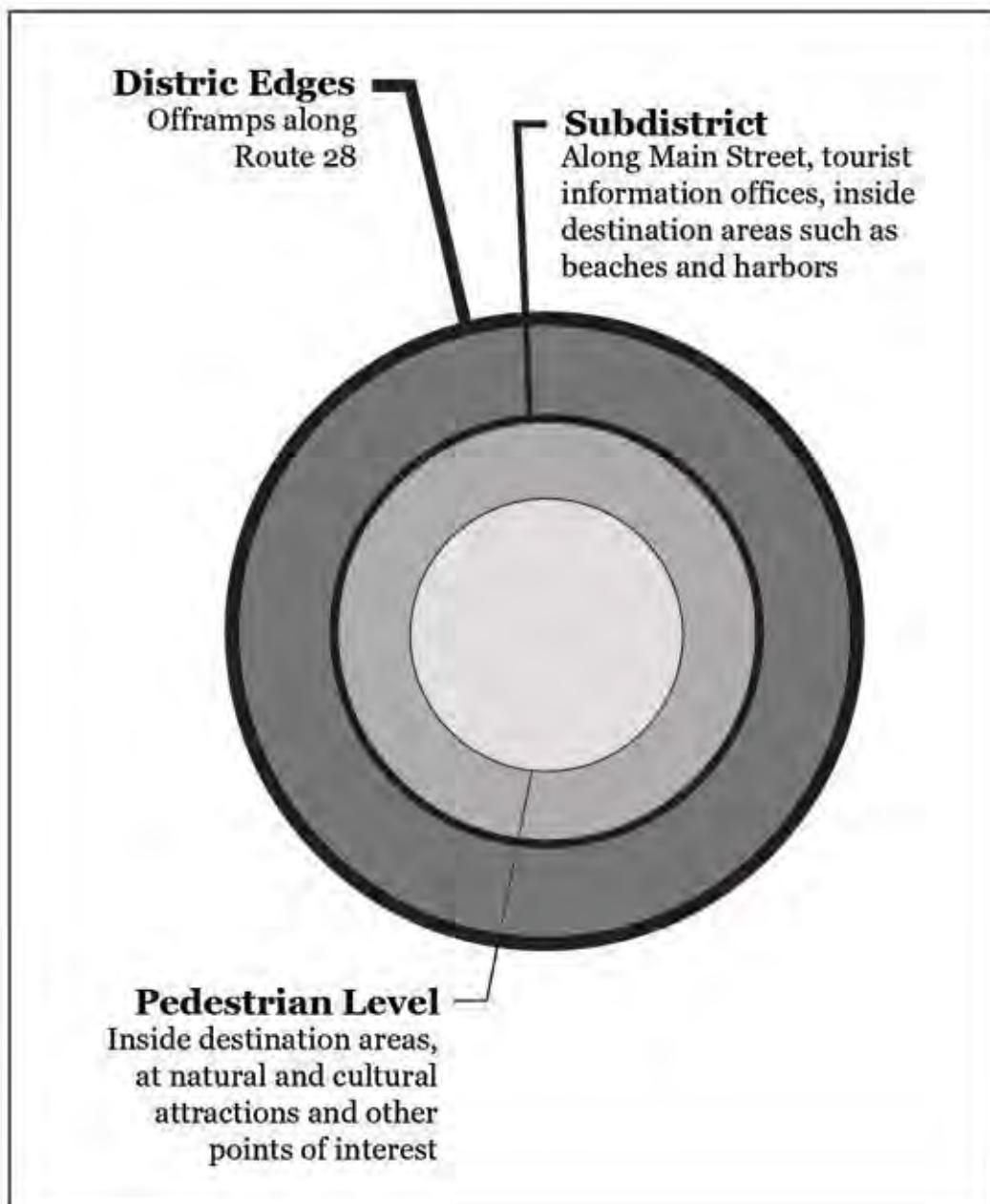
Wayfinding plans provide visual aid to direct visitors between destinations and spaces; they should not only be attractive, but also a cohesive part of the community identity with an intention of giving the visitor visual cues that they are in a specific place. Wayfinding should be oriented to residents familiar with the landscape as well as visitors new to a community.

The common method for establishing wayfinding signs is to use a hierarchy of community elements to direct the motorist, pedestrian or bicyclist to their eventual destination without use of excessive signage. This “peeling the onion” approach to planning has been effective in creating plans throughout the world.

Wayfinding in Falmouth

Currently, Falmouth has a partial collection of directional signs. Many of these signs are appropriate and helpful to the visitor; however, a fully integrated wayfinding program would incorporate these signs into an interconnected system to help visitors successfully navigate in unfamiliar surroundings. Signage should be designed to indicate a sense of place. At the same time, it is of great importance to carefully avoid wayfinding signage directing to specific businesses by name, as this opens issues of equity and fairness.

This report gives examples of potential signage types; it is recommended moving forward that the town work with a graphic designer to develop actual design standards. A potential signage hierarchy & placement in Falmouth would include features shown on the following graphic.



Wayfinding Hierarchy

District Edges

The following examples could be located at natural entrances to downtown Falmouth.

Direct to: Smaller sub-districts, major landmarks (e.g., Harbors, Beaches, Parks, Main Street, etc.).

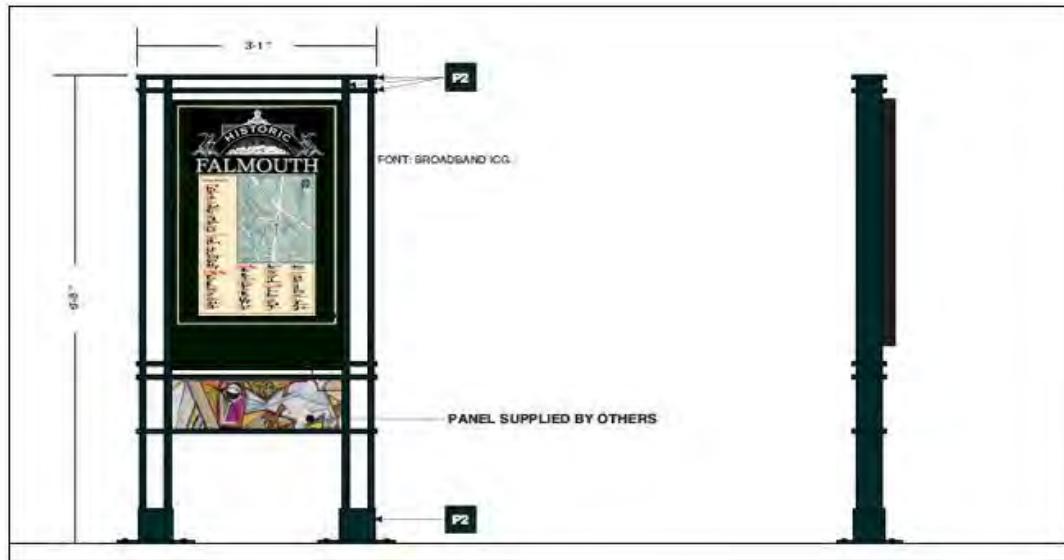
District Edge Signage could include:

Directional Signage: Routes pedestrian or vehicular traffic. Should have no more than four important destinations listed (e.g., “Tourist Information,” “Shopping,” “Harbor/Beach”).



Example of Directional Signage

Wayfinding Kiosks: Small structure located at pedestrian based connections. May have 1-4 panels of information including directional signage, maps, interpretive signs or advertisements.



Example of wayfinding kiosk with 2 information panels

Inside Sub-district

The following examples could be sited along main streets, at the tourist information office and inside destination areas such as harbors and beaches.



View of existing destination signage

Direct to: Larger destinations and parking.

Sub-district signage could include:

Informational and Parking signage: Routes pedestrian or vehicular traffic. Design should be clearly recognizable, message content should be simple. If symbols used, they should be those that are internationally recognized.



Example of Informational and Parking signs

Logo Trailblazers: Signs for Rail Trail, nature trails or waterfront boardwalks.
Should be distinctive, yet keeping with the design scheme of the overall signage plan.



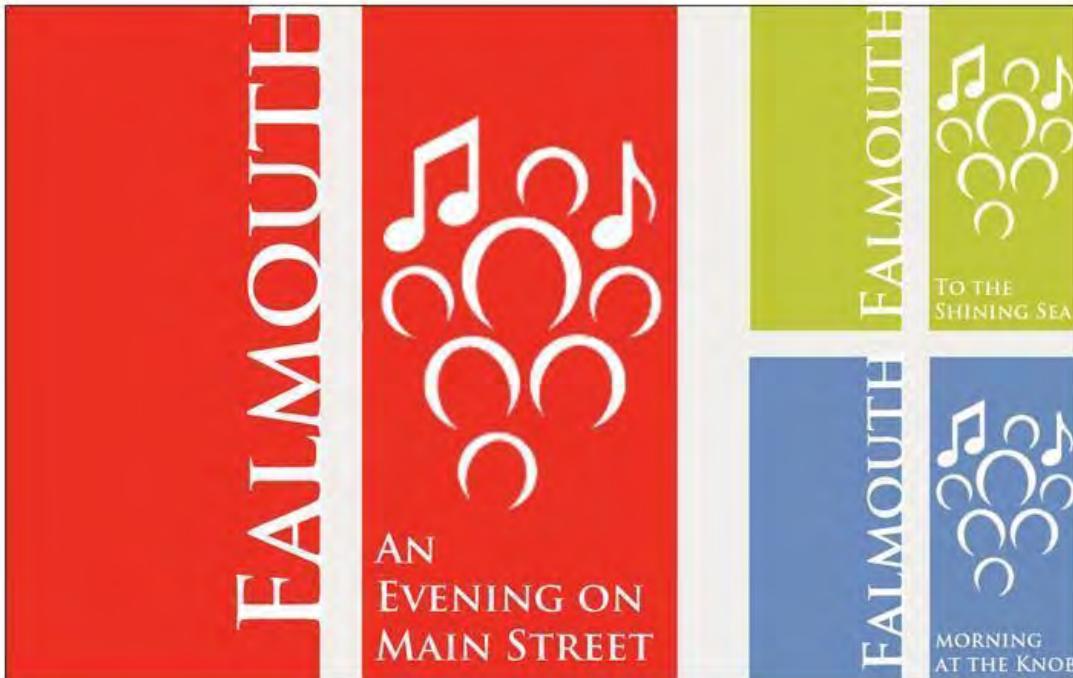
Example of Logo Trailblazer Concept versus the Standardized Bicycle Signage

Pedestrian Level

The following examples could be located inside destination areas, at natural and cultural attractions and at other points of interest. Any or all of these examples can be combined into a wayfinding kiosk at appropriate pedestrian connection points.

Direct to: Points of Interest.

Identity Banners/Signs: Decorative flags or banners (usually affixed to lightposts or poles) which designate a place, exhibition, or event. Can be easily replaced to vary the pedestrian experience.

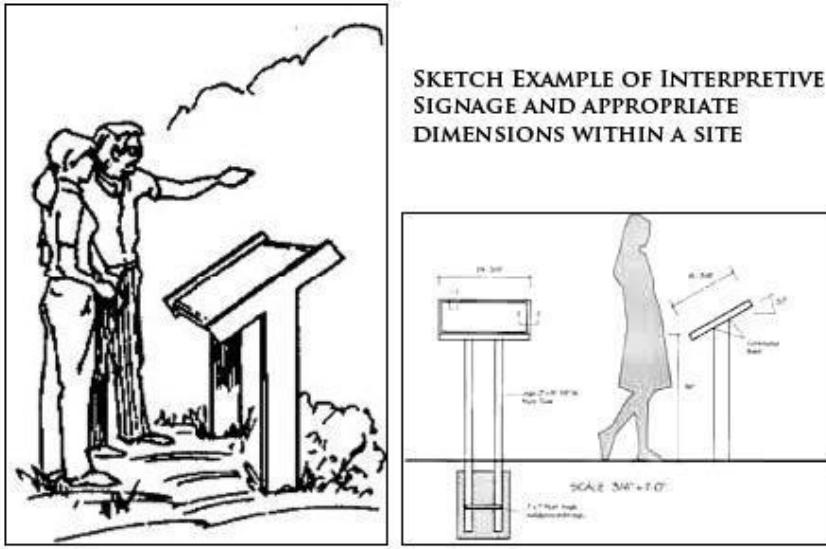


Examples of identity banners

Interpretive Signage: Interpretive information about specific local attractions (cultural or natural). Interpretive signs can be highly illustrative and can be more distinctive than other signs in the overall wayfinding plan.



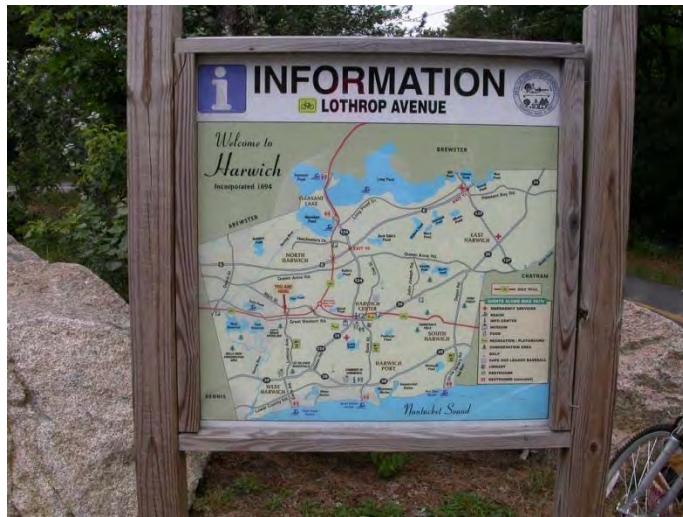
Example of Interpretive Signage indicating the Shining Sea Bikeway Bike Trail



Sketches of Interpretive Signage

Maps/Directories: These signs offer visitors an overview of their surroundings in the form of comprehensive site maps and directories. Most maps show a 'you are here' indicator. Outdoor maps show boundaries of an area, entry points, major buildings

and pertinent sites. Maps should be simplified for clarity of use. For districts with a high rate of turnover, establishments can be assigned a letter/number, and listed on a replaceable directory as part of a kiosk.



Example of map signage currently in use in Harwich

INDUSTRY SIGNAGE STANDARDS

For wayfinding to function as it's intended, it must display useful information, be placed at an accessible point at a proper viewing height, and be adequately illuminated. Additional considerations include:

Typeface

Typefaces on directional, informational, and logo trailblazing signs, as well as main points that should be viewed at a distance from interpretive signs and maps, should be at a minimum 3 inches in height. Letter styles should be simple and avoid flourishes. Text which includes a mixture of capital letters and lowercase is more readable than text in all caps. Text must contrast clearly against the background. The demands of the aging eye especially need clear text styles including fonts such as Helvetica (a sans serif), and Garamond (a serif, more easily read for blocks of text).

Color

Foreground and background colors should contrast to ensure readability. Darker colors work best for backgrounds. Limit the number of different colors on general signage to 3-4. On interpretive signs and maps, a good rule of thumb is to have at most 8-9 colors in text, legend, or design elements.

Bicycle signs are standardized to adhere to certain color standards:

Yellow = warning

Green = guiding signs

Red, White or Black = Regulatory signs

The mixing or misusing of these sign types can lead to confusion for bikers accustomed to a signage standard. In order to incorporate a standardized bicycle sign into a wayfinding program, 'Logo trailblazer' signs could be matched with appropriate guiding signs.

Symbols and Logos

Internationally-recognized symbols are best to use, such as "P" for parking or "H" for hospital (see attached for examples). Logos should be kept small and should not compete with the message on a sign. Logos for districts or sub-districts should be used in conjunction with a text message.



Example of directional sign integrating logo & text

MATERIALS & FABRICATION

Panel Height: Signs must be 7' from ground to satisfy ADA requirements. For interpretive signs, panels should be positioned to be easily readable.

Width: Generally 40" or less.

Horizontal Clearance: Panels should be at least 12" from street curbs to accommodate vehicles turning in parking areas.

Materials:

Standard bicycle signage is fabricated of powder coated steel from transportation sign fabricators. For larger signage, such as interpretive signs and maps shown on a scale of 18"x24", 24"x36" up to 40" in width, materials include:

- HPL (High Pressure Laminate) where high resolution prints are laminated under high pressure
- Polycarbonate/Aluminum Composite
- Fiberglass embedded Inkjet
- Porcelain Enamel, where graphics are molecularly fused to porcelain enamel (the most durable and expensive option).
- Additionally, the use of glass encased bulletin boards is often used for areas where signage is frequently changed. Signage materials can be produced stand alone and shipped for inclusion in a self-made stand, or fabricated to fit into bases to be installed by the buyer.

Depending on the design, signs can be designed by a graphic artist with print-ready files sent directly to the sign fabricator.

Exhibit Bases:

Bases and kiosks to hold sign panels must be sturdy and weather-resistant, made from materials such as powder-coated or Corten steel, treated wood or recycled plastic composite. Breakaway footers (which secure posts to concrete footings with bolts) are recommended, for their intrinsic replaceability if outdated, damaged or vandalized.

MAINTENANCE

Vandalism of sign panels is a common occurrence - Approximately 3-5% of elements in a wayfinding program are damaged or destroyed every year – therefore wayfinding plans should develop ongoing maintenance and replacement programs.

Additionally, prevention measures which can be put into place to deter vandals include placing signage at a height that is difficult for vandals to reach, or and choosing a signage material that does not easily scratch and can be easily cleaned (HPL or porcelain).

SOURCES CONSULTED FOR WAYFINDING PLANNING:

American Planning Association, 2006. *Planning and Urban Design Standards*.

Berger, C. 2009. *Wayfinding: Designing and Implementing Graphic Navigational Systems*.

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Nini, P. 2006. *Typography and the Aging Eye: Typeface Legibility for Older Viewers with Vision Problems*.



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